

DELAWARE Nutrient Management Notes

Vol. II, No. 1

Spring 2001



Equipment for Effective Poultry Litter Application

Applying nutrients at the correct rate and time is important to ensure efficient and cost effective use of manure and fertilizers. For poultry litter, the proper selection and calibration of application equipment, along with manure nutrient analysis, are necessary to achieve correct application rates that match crop nutrient requirements. This issue of *Nutrient Notes* will focus on manure application equipment and management as well as new technology available to assist growers with nutrient management.

WHAT IS THE BEST TYPE OF SPREADER FOR POULTRY LITTER?



- Poultry litter is unique compared to other types of manure. It is usually much dryer and lighter than dairy or swine manures. It also has higher concentrations of nitrogen, phosphorous, and potassium. As a result, the equipment required to apply poultry litter is different than for other types of manure. Additionally, poultry manures differ in texture and nutrient value based on the bird type (i.e., broiler, breeder, and layer).
- Spinner spreaders are found to be the most effective type of applicator for poultry litter. Once calibrated, they provide uniform coverage and consistent application rates. These spreaders typically consist of two spinners at the rear that rotate at high speed and deliver manure across a swath width of approximately 30 to 40 feet. The application rate is usually changed by opening or closing an endgate at the rear that regulates the flow of manure onto the spinners. Some spreaders are also equipped with a two-speed conveyor that can be used to adjust the application rate.
- Other types of spreaders like box (or beater-type) and side-delivery spreaders are designed for wet, high-density manures typically produced by larger animals like cattle. As a result, these types of spreaders cannot achieve the low application rates required for poultry litter. Typically, box spreaders cannot be adjusted to apply less than 3 to 4 tons of litter per acre whereas spinner spreaders can achieve consistent rates as low as 2 to 3 tons per acre. In addition, box spreaders are not able to provide uniform spread patterns for dry manures like poultry litter.

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Technical Information within this newsletter was provided by Jim Glancey and his colleagues at the University of Delaware.

WHY SHOULD I CALIBRATE MY MANURE SPREADER?

Most spreader manufacturers provide recommendations (either in the users manual or printed on the spreader) for the spreader settings and travel speeds required for different manure application rates. However, for a given spreader setting, application rates can vary significantly due to manure moisture content, manure type (crust vs. total clean-out), and bedding characteristics. Therefore, the recommendations from spreader manufacturers are only estimates and will not be correct for most farming operations. Only through field calibration can the correct spreader settings be determined to achieve the required application rate.

Calibration of a manure spreader will help achieve the maximum economic value of the nutrients in the litter.

HOW CAN I CALIBRATE MY MANURE SPREADER?

Manure spreaders can be calibrated in one of three ways:

- ▶ **TARP METHOD** - Place a tarp on the field. Spread manure on the tarp, and then weigh the manure collected. To determine the application rate, use the following formula:

$$\text{Application Rate (tons/acre)} = \frac{\text{lbs. of litter on tarp} \times 21.8}{\text{width of tarp (ft.)} \times \text{length of tarp (ft.)}}$$

For example, if 14 pounds of manure are collected on a 10ft x 12ft tarp, the application rate would be 2.5 tons per acre. This method should be repeated three times to determine the average application rate.

- ▶ **SWATH WIDTH AND DISTANCE METHOD** - Determine the weight of a spreader load. Measure the swath width and distance you travel to empty a full load. Use the weight and area covered to determine the application rate using the following formula:

$$\text{Application Rate (tons/acre)} = \frac{\text{lbs. of litter in spreader} \times 21.8}{\text{swath width (ft.)} \times \text{distance traveled (ft.)}}$$

For example, if the net weight of litter in a spreader is 7,000 pounds, the swath width is 35 feet and distance traveled is 2,000 feet, the application rate would be 2.2 tons per acre.

- ▶ **LOADS PER FIELD METHOD** - Determine the weight of a spreader load. Count the number of loads applied to a field. Use the total weight of manure and the number of acres covered to determine the application rate. If you are not able to weigh your spreader, for estimation purposes, you can use the volume capacity of your equipment to approximate the total weight of the load in pounds. Although the bulk density of litter can be highly variable, the following conversions can be used for “average” litter:

1 cubic foot of litter = 30 pounds, and 1 bushel of litter = 35 pounds.

Once the application rate of the spreader is determined, the spreader should be adjusted and the application rate measured again until the desired application rate is achieved. To adjust the application rate, the following can be changed:

- **Height of the Endgate** - This is usually the most effective way to make changes in the application rate.
- **Driving Speed** - This approach can be used for spreaders equipped with PTO-driven conveyors. Ground speed should be changed by choosing a different tractor gear, not by increasing or decreasing engine speed. For spreaders that are ground-driven, changing driving speed is not an effective method for adjusting the application rate.
- **Speed of the Conveyor** - If the spreader is equipped with multiple drive sprockets or has a hydraulic conveyor drive, use this method to increase or decrease the conveyor speed.

WHAT OTHER EQUIPMENT AND TECHNOLOGY IS AVAILABLE TO HELP MANAGE NUTRIENTS?

- **Global Positioning System (GPS)** – This technology was originally developed by the United States Department of Defense in the 1970s. Today, this technology is available for many non-military uses, especially in agriculture. GPS equipment comes in a wide variety of platforms, from handheld, to having the receiver mounted in a combine or tractor.
- **Soil and Yield Mapping** – Using GPS, soil samples can be collected at specific locations within a field. Typically, soil samples are taken every two acres. The soil data and GPS position information can then be used to create a field map for each soil category and nutrient level. These maps allow growers to identify and manage soil and nutrient variability within a field. Yield mapping services provide valuable information to assess soil productivity and trends that may influence nutrient management. Many farm management decisions can be simply judged on yield maps for crop production. Check with your local extension office, crop consultant, or fertilizer dealer for mapping services and prices in your area.
- **Site-Specific and Variable Rate Technology** – Application equipment has been developed that can automatically adjust the amount of commercial fertilizer applied as the applicator moves through the field. The equipment allows nutrients to be applied only where they are needed based on a soil map and crop requirements. This approach, referred to as “Precision Agriculture”, has the potential to reduce the environmental impact and increase profitability since nutrients will only be applied where they will be utilized by the crop. Capital equipment costs are usually high, and a thorough cost analysis should be conducted.
- **Computer Programs** are available that can assist with farm nutrient management. The program can provide an efficient way to organize nutrient mapping data along with other relevant field information (i.e., yield maps, pesticide use, crop history, soil type, etc.). These programs will allow farm managers to conveniently maintain long term nutrient and field records. In addition, growers can use this information to assess the effectiveness of various nutrient management practices including variable rate management on crop yields. Contact one of the University of Delaware Cooperative Extension offices for more information on these computer programs.

HOW OFTEN SHOULD I CALIBRATE MY MANURE SPREADER?

Calibration should be performed each season. In addition, calibrations should be performed as manure type (crust vs. total clean-out) and moisture content change. Additionally, calibrations should be made to reflect changes in nutrient content of the litter. Factors influencing litter nutrient composition include litter age, type of poultry, composition of diet, litter amendments, and many other management-related variables.

Spreaders should be calibrated for each application rate required.

Keeping the conveyor chain, endgate, and spinners clean from manure build-up is important to achieve consistent application rates. Also, check and maintain recommended spinner speeds to insure a good spread pattern.

For more information on spreader calibration methods, contact one of the University of Delaware Cooperative Extension offices or your County Conservation District.



HOW TO GET INVOLVED AND VOICE YOUR OPINION:

Meet and talk to
commission members

Attend commission meetings;
contact the Delaware Nutrient
Management Program for dates
and locations.

Nutrient Management Program

(302) 698-4500

or

1-800-282-8685

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Upcoming DNMC meetings

- MAY 8TH, 7PM
- JUNE 12TH, 7PM

DDA, Dover DE

Doc. # 65 01 12 01 04 16

Delaware Nutrient Management Commission

<u>NAME</u>	<u>APPOINTMENT</u>	<u>CONTACT INFO.</u>	<u>REPRESENTATION</u>	<u>TITLE</u>
William Vanderwende	Senate	(302) 349-4423	Sussex County Dairy Producer	Chairman, Commission
David Baker	Senate	(302) 378-3750	New Castle County Grain Industry	Chairman, Personnel Subcommittee; DNMC Vice Chairman
Edwin Brown, II	Governor	(302) 227-2053	Golf Course/Lawn Care Industry	
Stephen Corazza	House of Representatives	(302) 653-3583	New Castle County Poultry Producer	Chairman, Government Interaction Subcommittee
Carlton Fifer	Senate	(302) 697-2141	Kent County Vegetable Industry	
John Hughes	Governor	(302) 739-4411	Director, Division of Soil & Water Conservation DNREC	
David Jones	House of Representatives	(302) 422-8017	Environmental Advocacy Group	
Tony Keen	Senate	(302) 684-3196	Nutrient Consultant	Chairman, Technology Subcommittee
Connie Larimore	House of Representatives	(302) 398-8304	Kent County Poultry Producer	
Dale Ockels	Governor	(302) 684-0456	Sussex County Swine Producer	Chairman, Compliance & Enforcement Subcommittee
Brian Schilling	House of Representatives	(302) 934-7684	Commercial Applicator	Chairman, Industry Relations
Carl Solberg	Senate	(302) 492-1225	Environmental Advocacy Group	Chairman, Program & Education Subcommittee
Richard Sterling	Governor	(302) 653-7060	Commercial Nursery Industry	
Charles West, II	House of Representatives	(302) 238-0137	Sussex County Poultry Producer	Chairman, Budget Subcommittee
John F. Tarburton	(Ex-Officio)	(302) 698-4500	Secretary, Dept. of Agriculture	
Nicholas A. DiPasquale	(Ex-Officio)	(302) 739-4403	Secretary, Dept. Natural Resources & Environmental Control	
Vincent Meconi	(Ex-Officio)	(302) 577-4502	Secretary, Dept. of Health and Social Services	
William Rohrer	(Ex-Officio)DNMC	(302) 698-4500	Nutrient Management Program Administrator	
Vacant	Governor		Public Citizen	

DELAWARE

Nutrient Management Program

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